Syllable-Based Sound Changes in Early Armenian*

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The sound changes analyzed in this paper occurred between Proto-Indo-European (PIE) and Classical Armenian (CArm.). They have all been discussed before.[1] My goal is not to provide new evidence for or against these sound changes but rather to describe them in a uniform phonological framework and thereby to derive explanations for them from certain preference laws for phonological structure.[2]

Classical Armenian had the following speech sound inventory; the speech sounds are designated by customary transcriptions of their orthographic symbols.[3]

PLOSIVES	aspirated	plain	voiced
labial	pʿ	p	b
dental	tʿ	t	d
velar	kʿ	k	g

AFFRICATES	aspirated	plain	voiced
dental	cʿ	c	j
palatal	čʿ	č	ǰ

FRICATIVES	voiceless	voiced	
labial		v	
dental	s	z	
palatal	š	ž	
velar	x		
glottal	h		

NASALS			
labial	m		
dental	n		

LIQUIDS			
central	r	ī	
lateral	l	ḷ	

SEMIVOWELS		
palatal	y	
velar	w	

VOWELS	front	central	back
high	i		u
high-mid	ê	ə	
mid	e		o
low		a	

If Proto-Indo-European is assumed to have had plain, voiced, and voiced aspirated plosives (T, D, and D^h, each capital letter standing for an entire series), then a consonant shift - similar to Grimm's Law for Germanic - must be posited for Classical Armenian:

PIE		CArm.
T	>	Tʿ
D	>	T
D^h	>	D

(With regard to Classical Armenian, the capital letters stand for plosives as well as their corresponding affricates, e.g., Tʿ for pʿ, tʿ, kʿ, cʿ, čʿ.) However, since the assumption of a Proto-Indo-European $T/D/D^h$ inventory has in the recent past become questionable,[4] and since I do not want to burden the present study with this controversy, I will use the Classical Armenian plosive symbols themselves in reconstructed forms and call these forms Pre-Armenian (Pre-Arm.) rather than Proto-Indo-European. This seems legitimate because the Classical Armenian Consonant Shift - no matter in which form it occurred, if at all - may be assumed to have preceded all other sound changes between Proto-Indo-European and Classical Armenian, including most definitely all changes to be analyzed here.[5]

The changes for which I would like to offer a coherent description in this paper are the following:

1. prothesis
2. metathesis
3. velar aspiration
4. the Great Armenian Puzzle (GAP)

1. Prothesis is used (a) to avoid word-initial r and (b) as one of several devices for avoiding word-initial consonant groups.

a. The prothetic vowel appearing before r is normally e, sometimes a, rarely o:

Pre-Arm. $+$rek^{w}os (Ved. rájaḥ 'darkness', Gk. ἔρεβος 'darkness of the underworld', Goth. riqis 'darkness'), CArm. erek 'evening'

Pre-Arm. $+$rewis (Skt. raviḥ 'sun'), CArm. arew 'sun'

Pre-Arm. $+$ruk- (Gk. ἐρεύγομαι, aor. ἤρυγον, Lat. ērūgō 'I belch', Lith. rugiu), CArm. orcam < $+$orucam 'I vomit'

b. The prothetic vowel appearing before consonant groups is normally e, sometimes a:

Pre-Arm. $+$brát'ēr (Ved. bhrā́tar-, Gk. φράτηρ, Lat. fráter, Goth. brōþar 'brother'), CArm. eɫbayr 'brother', with general change of intervocalic dental plosives into y, syncope, and dissimilation of $+$. . . r$^{\$}$ . . . r$^{\$}$ into . . . ɫ$^{\$}$ . . . r$^{\$6}$

Pre-Arm. $+$bréwr̥ (Gk. φρέαρ < $+$φρέϝαρ), CArm. aɫbewr 'spring, well'

Pre-Arm. $+$k^{w}ráwōn (Ved. grávan- 'pressing stone', OIr. bráu 'millstone', OCS žrŭnŭvi 'mill', cf. ON kvern, Lith. gìrnos), CArm. erkan 'millstone'

Pre-Arm. $+$trak'u (OHG trahan 'tear') alongside $+$tak'ru (Gk. δάκρυ, Goth. tagr, OHG zahar 'tear'), CArm. artawsr 'tear'

Pre-Arm. $+$srutís (Ved. srutíḥ, Gk. ῥύσις), CArm. aṙu < $+$aṙuy < $+$arsuy < $+$asruy 'canal'.

All of these initial consonant groups involve $+$r. Case (b) is therefore in the literature identified with case (a): $+$Cr is assumed to have metathesized into $+$rC not only medially, see below, but also initially, and prothesis is then posited for initial $+$r only.[7] I find this implausible: Why should a reasonable group of word-initial clusters $+$Cr metathesize into the rare and unusual group of word-initial clusters $+$rC? A change of $+$eCrV into erCV, by contrast, would be quite normal and has to be assumed anyway, as will be seen directly.[8]

2. Metathesis changes intervocalic clusters of consonant plus $+$r into clusters of $+$r plus consonant:

Pre-Arm. $+$k'ubrós (Ved. śubhráḥ 'brilliant'), CArm. surb 'holy'

Pre-Arm. ⁺*switro-* (Gk. ἱδρώς 'sweat', Lith. *sviêdri*, Lat. *sūdor*), CArm.
  kʿirtn 'sweat'
Pre-Arm. ⁺*meǵri* (Gk. μέχρι 'until'), CArm. *merj* 'near, at'
Pre-Arm. ⁺*swesrV-* (Ved. dat. *svásre*), CArm. *kʿeṝ* 'sister (gen. dat.
  loc.).'[9]

3. Velar aspiration appears on a velar consonant (including pa-
latalized velars as well as the velar plosive resulting from the
strengthening of ⁺*w*, see below) when an aspirated consonant (in-
cluding ⁺*s*[10]) is lost from the same syllable margin:
Pre-Arm. ⁺*swópnos* (Ved. *svápnaḥ*, Av. *xᵛafna-*, cf. Gk. ὕπνος),
  CArm. *kʿun* 'sleep'
Pre-Arm. ⁺*swesōr* (Ved. *svásar-*, Goth. *swistar*), CArm. *kʿoyr* 'sister'
Pre-Arm. ⁺*wĭkʿm̥tĭ* (Av. *vīsaiti*, Gk. Dor. ϝικατι, Lat. *vīgintī*), CArm.
  kʿsan 'twenty'[11]
Pre-Arm. ⁺*tʿwe-/tʿwo-* (Ved. *tva-*, Av. ϑwa-, Gk. σε- < ⁺τϝε-), CArm.
  dat. acc. *kʿez*, gen. *kʿo* 'you'
Pre-Arm. ⁺*tʿwr̥-*, simplified from ⁺*kʷʿtʿwr̥-*(Ved. *turíyaḥ*, Av. *tūiriia-*
  'fourth', *ā-xtūirīm* 'four times'), CArm. *kʿaṝ-* in *kʿaṝ-a-sun* 'forty',
  alongside *čʿorkʿ* 'four'
Pre-Arm. ⁺*suweks* (Gk. ἕξ, ϝέξ, Lat. *sex*, Goth. *saihs*), CArm. *vecʿ* 'six'
Pre-Arm. ⁺*épʿr̥ksketʿ* (Ved. *áprcchat* 'he asked', Lat. *poscō* 'I de-
  mand'), CArm. *eharcʿ* 'he asked', pres. *harcʿanem*
Pre-Arm. ⁺*pʿr̥kskā* (Skt. *prcchā* 'question', OHG *forsca*, OIr. *arc*),
  CArm. *harcʿ* 'question'.

4. The Gap consists in the change of Pre-Arm. ⁺*tw-* into
CArm. *erk-*:[12]
Pre-Arm. ⁺*twó* (Ved. *dvá̄* 'two', Av. *duua*, Gk. δύο, δύω, ⁺δϝω in
  δώ-δεκα 'twelve', Goth. *twai*, OCS *dŭva*), CArm. *erku* 'two'
Pre-Arm. ⁺*twi-* (Ved. *dvi-* 'two-', Av. *bi-*, Gk. δι-, Lat. *dui-*, *bi-*, OHG
  zwi-, Lith. *dvi-*), CArm. *erki-* 'two', e.g., *erkeam* < ⁺*erki-am*
  'two-year old', with *am* 'year' < Pre-Arm. ⁺*smā* (Ved. *sámā*
  'half-year, year')
Pre-Arm. ⁺*twārós* (Gk. δηρός, Dor. δᾱρός, metrically ⁺δϝᾱρός, Ved.
  dūráḥ), CArm. *erkar* 'long'
Pre-Arm. ⁺*twi-*, zero grade of ⁺*twey-* (Av. *duuaēϑā* 'threat', Gk. δείδω
  < perf. ⁺δέ-δϝοι-α, δέος < ⁺δϝεγος 'fear'), CArm. *erki-* in
  erknčʿim 'I am afraid', aor. *erkeay* (< ⁺*erki-ay*), *erkiwł* 'fear'.

I will now present an interpretation of the illustrated changes in
a syllabic framework. The principal assumptions of this interpreta-

tion will be the following; the first is a language specific syllabication rule for Classical Armenian, and the other three are universal preference laws for syllable structure.

> **Classical Armenian Syllabication Rule:** Throughout the history of Classical Armenian (i.e., from Proto-Indo-European through Classical Armenian), internuclear clusters of two speech sounds were heterosyllabic: $-VCCV-\ \Diamond\ -VC\$CV-$.[13]

> **Syllable Onset Law:** A syllable onset is the more preferred, (a) the closer the number of speech sounds in the onset is to one, (b) the greater is the Consonantal Strength value of the first onset speech sound, and (c) the more sharply the Consonantal Strength drops from the first onset speech sound toward the following syllable nucleus.

> **Syllable Coda Law:** A syllable coda is the more preferred, (a) the smaller is the number of speech sounds in the coda, (b) the smaller is the Consonantal Strength of the final coda speech sound, and (c) the more sharply the Consonantal Strength drops from the final coda speech sound toward the preceding syllable nucleus.

> **Corollary:** The tendency for a syllable onset or a syllable coda to change is the greater the less preferred it is in terms of the Syllable Onset Law or the Syllable Coda Law, respectively.
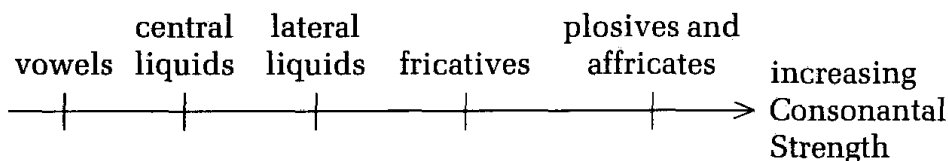
> **Syllable Contact Law:** The preference for a syllabic structure $A\$B$ increases with the difference in Consonantal Strength between the speech sounds B and A.

> **Corollary:** The tendency for a syllabic structure $A\$B$ to change increases with the difference in Consonantal Strength between the speech sounds A and B.

Note the order in which A and B appear in the Syllable Contact Law and its Corollary: A syllable contact $A\$B$ is the better the smaller the Consonantal Strength of A and the greater that of B; and the tendency for it to change is the stronger the greater the Consonantal Strength of A and the smaller that of B. In other words, "difference" is here understood not as a commutative term as in everyday language but as a noncommutative operation as in arithmetic, where, e.g., 5 minus 2, i.e., 3, is not the same as 2 minus 5, viz., -3.[14]

Consonantal Strength is a language-specific partial ordering for speech sounds. There is a universal preference law that a Consonantal Strength relation is the more preferred the more closely it corresponds to the inverse of the phonetic sonority relation for the phonetic correlates of the speech sounds; ideally, and very often in fact, the Consonantal Strength relation simply coincides with the inverse of the so-

nority relation. Since I am concerned here only with selected aspects of the phonological history of Classical Armenian, I need only a small subrelation of the Consonantal Strength relation for Classical Armenian, all parts of which seem to me to be entirely uncontroversial:

	central	lateral		plosives and	
vowels	liquids	liquids	fricatives	affricates	increasing

$$\overset{\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad}{\longmapsto\!\!\!\!\!-\!\!\!\!\!\longmapsto\!\!\!\!\!-\!\!\!\!\!\longmapsto\!\!\!\!\!-\!\!\!\!\!\longmapsto\!\!\!\!\!-\!\!\!\!\!\longmapsto\longrightarrow}$$ Consonantal Strength

With these assumptions, the four sound changes are interpreted as follows.

Ad 1. Prothesis. Prothesis is used to avoid undesirable word-initial syllable onsets. One of these is the onset ^+rV-. I do not know exactly what motivates this aversion against initial ^+r,[15] but I would like to point out that not only ^+r but also vowels, viz., the vocalic glides ^+y and ^+w, are eliminated from word-initial syllable margins, though not by prothesis but by strengthening: $^+y > j$ syllable-initially (except after vowels),[16] and $^+w > g$ syllable-initially:

Pre-Arm. ^+steryX (Gk. στεῖρα, cf. Ved. staríḥ 'sterile cow', Goth. staírō, Lat. sterilis), CArm. sterǰ 'sterile'

Pre-Arm. $^+woyniyo$- (cf. Gk. ϝοῖνος, Lat. vīnum), CArm. gini 'wine'

Pre-Arm. ^+wetos 'water' (cf. Goth. watō, OCS voda, Phryg. βεδυ, Hitt. wadar), CArm. get 'river'

Pre-Arm. $^+k^wowiyo$- 'from the cow' (Ved. gávya-, cf. CArm. kov 'cow'), CArm. kogi 'butter'.

It seems therefore that prothesis for ^+rV is part of a scheme to eliminate the weakest margins, viz., all speech sounds weaker than laterals, from word-initial syllable onsets. Such a scheme would be in harmony with the Syllable Onset Law which characterizes initial onset consonants as the less preferred the weaker they are; ^+y, ^+w, ^+r were the three weakest margins of Pre-Armenian.[17]

Prothesis is also used to avoid word-initial consonant groups, namely those that are not either simplified by deletion or coalescence (e.g., velar aspiration) or tolerated because the first of the consonants is a sibilant before an obstruent and thus capable of forming an appendix; the latter is a special treatment that is evident in many other languages, including, e.g., the alliterative behavior of the groups sp-, st-, sk in Germanic.[18] The Classical Armenian groups that are actually treated by prothesis are primarily those consisting of an obstruent plus ^+r (but see below for one further cluster). Prothesis breaks up the initial cluster owing to the Classical Armenian Syllabication Rule:

$+VCrV$- ◊ $+VC^\$rV$-. This rule is thus seen to constitute the real motivation for prothesis in the case of clusters, given the Syllable Onset Law by which *all* syllable onset clusters are disfavored, viz., less preferred than single onset consonants. With heterosyllabication by the Syllabication Rule, we have, by prothesis, $^\$CrV$- > $eC^\$rV$-, which is a syllable structure improvement relative to the Syllable Onset Law. Without the Syllabication Rule, we would have to assume $^\$CrV$ > $e^\$CrV$, with no recognizable improvement.[19]

Ad 2. Metathesis. Intervocalic $+Cr$ clusters are in the history of Classical Armenian syllabicated as $+C^\$r$, according to the Syllabication Rule. To the extent that the Consonantal Strength value of the $+C$ exceeds that of $+r$, the syllable contact is disfavored according to the Syllable Contact Law, and there will accordingly be pressure to change the contact so as to achieve a more preferred Consonantal Strength balance. The most elegant mechanism for reaching this goal is metathesis: $+C^\$r$ > $+r^\$C$.[20] In the history of Classical Armenian, metathesis followed prothesis: the structure resulting from prothesis before clusters is $+VC^\$rV$- according to the Classical Armenian Syllabication Rule (as already pointed out), and metathesis does not differentiate between these newly created $+C^\$r$ contacts and the inherited ones, as the examples presented to illustrate prothesis and metathesis clearly show.

Ad 3. Velar aspiration. Velar aspiration has to be viewed in connection with glide strengthening, the change of $+y$ and $+w$ into obstruents including in particular the change of $+w$ into $+g$ already exemplified. Any velar plosive (or related affricate), whether inherited or resulting from glide strengthening, receives the (voicelessness and) aspiration of a voiceless aspirate, including $+s$, within the same syllable margin when the aspirate itself is lost from the margin. The velar turns into *k'* (or *c'*); e.g., $+t'wo$- > $+t'go$- > $+t'ko$- > *k'o* 'your'; $+swésōr$ > $+sg$ . . . > $+sk$ . . . > *k'oyr*.[21]

Ad 4. The GAP. Meillet's rule Pre-Arm. $+tw$- (PIE $+dw$- according to the traditional reconstruction) > CArm. erk- is not generally accepted.[22] Viewed out of context, it is certainly one of the most striking sound changes ever proposed.[23] It seems to me that in the framework used here the change loses all surprise elements. First of all, the change is not limited to the word-initial position but has its exact counterpart intervocalically:

Pre-Arm. $+etwōn$, ablaut variant of $+etun$ (Gk. ὀδύνη, Aeol. ἐδύνα 'pain', OIr. *idu*), CArm. erkn, plur. erkunk' 'labor (at childbirth)'.[24]

Secondly, the change has to be related to glide strengthening, viz., $+w$ > $+g$, by which $+tw$ changes into $+tk$ (with voicelessness assimila-

tion). Thirdly, when initial, this cluster belongs to the universally dis-
favored ones; prothesis is a common device in the history of Classical
Armenian to avoid disfavored initial consonant groups. Fourthly, in-
tervocalic ^+tk, no matter what its source, has to be heterosyllabicated
according to the Classical Armenian Syllabication Rule: $^+VtkV >$
$^+Vt\$kV$. Finally, $^+t\$k$ does not constitute one of the preferred syllable
contacts; a common way to remedy disfavored contacts is the weaken-
ing of the final coda consonant in accordance with the Syllable Coda
Law, and since the weakest consonantal member of the dental order is
the central liquid, the change of $^+t\$k$ into $r\$k$ is entirely a natural one,
an instance of Coda Weakening.[25]

In concluding, I will derive some characteristic Classical Arme-
nian forms from their Pre-Armenian etyma. The sound changes and
their applications called upon in the derivations are the following:

- Glide Strengthening (including voicelessness assimilation in
  contact with voiceless speech sounds): $^+w > {}^+g^w > g \, (> k)$ in
  syllable onsets
- Velar Aspiration: $^+k > k^‘$ in a syllable onset from which an aspi-
  rate is lost
- Prothesis: the rise of a prothetic vowel (manifest as *e-* in the ex-
  amples used here) before word-initial consonant clusters
- Metathesis: $^+b\$r > {}^+r\$b$
- Coda Weakening: $^+t\$k > r\$k$

In addition, the Classical Armenian Syllabication Rule (*-VCCV-* ◊
-VC\$CV-) will be cited in the appropriate places of the derivation. All
remaining changes required to derive the Classical Armenian forms
from their Pre-Armenian etyma are summarily labeled Further Modi-
fications, without regard for their relative chronological place in the
derivations. - The table with the derivations may at the same time
serve as a summary of the issues dealt with in this article.

**Table: Derivation of Characteristic Classical Armenian Forms
from Their Pre-Armenian Etyma**

$^+k̓ub\$ros$	$^+brāt̓ēr$	$^+t̓wo-$	$^+et\$wōn$	^+two	Syllabication Rule
—	—	t̓ko-	et$k-	tkō	Glide Strengthening
—	—	k̓o-	—	—	Velar Aspiration
—	eb$rā-	—	—	et$kō	Prothesis, Syll. Rule
-ur$bo-	er$bā-	—	—	—	Metathesis
—	—	—	er$k-	er$k-	Coda Weakening
surb	*eɫbayr*	*k̓o*	*erkn*	*erku*	Further Modifications

NOTES

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As for my use of symbols, note that I distinguish between the plus sign, denoting reconstructed forms, and the asterisk, denoting incorrect forms. This distinction is not made in quoted material where the asterisk marks reconstructed forms. The raised dollar sign indicates syllable boundaries.

[1] My description is based on the most recent full-length presentation of the synchronic and diachronic phonology of Classical Armenian in Rüdiger Schmitt, *Grammatik des Klassisch-Armenischen mit sprachvergleichenden Erläuterungen* (= Innsbrucker Beiträge zur Sprachwissenschaft, 32), Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck, 1981, ch. II. 1-4 (pp. 25-79). In particular, nearly all etymological correspondences are taken from this book. Naturally, other full-length studies have been compared, e.g., Robert Godel, *An introduction to the study of Classical Armenian*, Wiesbaden: Ludwig Reichert, 1975, esp. chs. 1, 2, and 5, and the fundamental work by Antoine Meillet, *Esquisse d'une grammaire comparée de l'arménien classique*, Wien: Imprimerie des PP. Mekhitharistes, ¹1903, ²1936.

[2] The concept of (weakly) explaining language-specific structures and changes by relating them to universal preference laws is developed in my paper "Causality in language change: Theories of linguistic preferences as a basis for linguistic explanations", *Folia Linguistica Historica* 6 (1983), 5-26.

[3] My transcriptions are those of Schmitt, *Grammatik*, except that I use *u* rather than *ow* for /u/. Pedersen's interpretation of the Classical Armenian voiced stops and affricates as actually having been voiced aspirated, which is relevant to the controversy referred to in note 4 below, remains without consequence for the main discussion of the present paper (Holger Pedersen, "Armenisch und die Nachbarsprachen", *Zeitschrift für vergleichende Sprachforschung* 39 (1906), 334-484, p. 337; reprinted in Holger Pedersen, *Kleine Schriften zum Armenischen*, ed. by Rüdiger Schmitt, Hildesheim - New York: Georg Olms. 1982, 112-263, p. 115; cf. also Hans Vogt, "Les occlusives de l'arménien", *Norsk Tidsskrift for Sprogvidenskap* 18 (1958), 143-161 plus map; Émile Benveniste, "Sur la phonétique et la syntaxe de l'arménien classique", *Bulletin de la Société de Linguistique de Paris* 54 (1959), 46-68; Frederik Kortlandt, "Notes on Armenian historical phonology II (The second consonant shift)", *Studia Caucasica* 4 (1978), 9-16 - "It is possible that development I ['Rise of aspiration of voiced stops'. . .] was in progress during the classical period, as Džaukjan suggests", p. 13).

[4] Aspects of this controversy (with bibliography) and my own view of the matter are presented in "Hochgermanisch und Niedergermanisch: Die Verzweigungstheorie der germanisch-deutschen Lautverschiebungen," *Beiträge zur Geschichte der deutschen Sprache und Literatur* (Tübingen) 106 (1984), 1-45. My own reconstruction

posits $^+$T'/T'/Ḍ for Proto-Indo-European, i.e., voiceless aspirated plosives, voiceless *fortis plosives (possibly glottalized, viz. ejective), and voiceless lenis plosives, corresponding to the traditional* $^+$T/D/D^ɦ. The "Armenian Consonant Shift" is in this *view reduced to the transformation of a fortis/lenis contrast into a voice contrast:* $^+$T'/Ḍ > T/D. An item omitted in the cited article and containing a survey of positions in the controversy is Adolf Erhart, "Nochmals zum indo-europäischen Konsonantismus," *Zeitschrift für Phonetik* 34 (1981), 403-409. Frederik Kortlandt's important study "Proto-Indo-European obstruents," *Indogermanische Forschungen* 83 (1978), 107-118, likewise escaped my attention.

[5] See Schmitt, *Grammatik*, p. 56, and the statement concerning metathesis in Maurice Grammont, "La métatèse [sic] en arménien," *Mélanges de linguistique offerts à M. Ferdinand de Saussure*, Paris: Librairie Ancienne Honoré Champion, 1908 [also Geneva: Slatkine Reprints, 1975], 231-243, pp. 233, 236. An exception is the relative chronology in Frederik Kortlandt, "On the relative chronology of Armenian sound changes," *First International Conference on Armenian Linguistics: Proceedings*, ed. by John A.C. Greppin, Delmar, New York: Caravan Books, 1980, 97-106; but his chronology is motivated in part by his own assumptions about both the *Proto-Indo-European speech sounds* and their development in Armenian, assumptions which I do not share. To mention only two aspects of this reconstruction: Kortlandt posits *voiceless, glottalic, and aspirated plosives for Proto-Indo-European*, corresponding to the traditional T, D, and D^ɦ, respectively (pp. 98f.); in his "Notes II," p. 15, and "Obstruents," p. 107, *the voiceless plosives are furthermore identified as fortis, the others, lenis,* and in "Obstruents," pp. 117f., and especially in a recent paper, "Proto-Indo-European glottalic stops: The comparative evidence" (forthcoming in *Folia Linguistica Historica* 1985), the glottalic plosives are identified as preglottalized voiced. The voiceless aspirates of Classical Armenian are derived from the plain voiceless plosives of Proto-Indo-European via frication: T > þ > T' (cf. Werner Winter, "Problems of Armenian phonology I, II, III," *Language* 30 (1954), 197-201; 31 (1955), 4-8, 38 (1962), 254-262); and the change of those þ that had not been lost or otherwise modified, viz. þ > T' ("shortening"), is assumed to have been one of the very latest Armenian sound changes ("Relative chronology," pp. 100, 102, 104). In my opinion the correct assumption is positional frication of $^+$T', with no need arising for the positing of late parts of an Armenian Consonant Shift. A recent detailed discussion of the presumed Armenian Consonant Shift in a traditional framework is contained in Andrzej Pisowicz, *Le développement du consonantisme arménien* (= Polska Akademia Nauk - Oddział W Krakowie, Prace Komisji Językoznawstwa, 43), Wrocław: Polska Akademia Nauk, 1976. Attempts at demonstrating the comparative recency of the presumed Consonant Shift with the help of loanwords (notably *partēz* 'garden', compare Gk. παράδεισος, Hebr. *pardēs*, also Avest. *pairidaēza-* 'fenced enclosure', with *t* for *d* but no change of *p*) do not seem to have been very successful; cf. most recently Charles De Lamberterie, "Armeniaca I-VIII: Études lexicales," *Bulletin de la Société de Linguistique de Paris* 73 (1978), 243-285, esp. 246-250 (pro) and Rüdiger Schmitt, "Iranisches Lehngut im Armenischen," *Revue des Études Arméniennes* 17 (1983), 73-112, esp. 77, with reference to De Lamberterie there (note 9) as well as in *Grammatik*, p. 74, note A (skeptical).

[6] This dissimilation actually seems to be restricted to the group $^+$. . .r^{s}b. . .r^s, as shown by the word *ardar* 'just', cf. Meillet, *Esquisse*, [1]1903: 25, [2]1936: 46; one may also compare *erkar* 'long'.

[7] Grammont, "Métatèse," p. 234; Eduard Hermann, *Silbenbildung im Griechischen und in den andern[sic] indogermanischen Sprachen,* Göttingen: Vandenhoek & Ruprecht, 1923 [2nd ed. 1978], p. 332; most recently Schmitt, *Grammatik,* p. 78: "Nach Eintreten der Metathese geriet rb in den Wortanlaut; zur Vermeidung eines solchen, nicht statthaften r-Anlauts erhielten die Formen *rbayr, *rbewr einen prothetischen Vokal vorangestellt (*erbayr, *arbewr)." Professor Schmitt now considers the explanation offered below to be preferable, as he kindly wrote in his letter (note * above). - Wolfgang U. Dressler, in his letter (note * above), considers the possibility that apocope preceded metathesis so that surb < +subr; and since I (correctly, in his opinion) assume the analogical extension of rules from one position to another anyway (see note 21 below), this could be the origin of the metathesis in eɫbayr. I prefer not to follow this suggestion because I do not recognize a relevant analogy between br > rb in a coda and a hypothetical br > rb in an onset. Owing to the Syllable Onset Law and the Syllable Coda Law (see below), the relevant analogical extension would be the mirror image rb > br. Therefore analogical rule extension from codas to onsets cannot be at the root of the metathesis in eɫbayr. The prothesis there cannot be related to an inital r.

[8] The relative chronology prothesis before metathesis is also assumed - I believe for the first time - in Kortlandt, "Relative Chronology," p. 103: "I assume the rise of a prothetic schwa before initial clusters at this stage because it is a prerequisite for the metathesis." Kortlandt does not argue why prothesis should be a prerequisite for metathesis. An argument will be presented later in this paper, including an explanation of prothesis before clusters.

[9] The metathesis of +sr is not certain; regressive assimilation is another possibility. Note that the more general formulation of metathesis requires no additional assumption, because the intermediate change of +rs into r̄ is directly reflected in Pre-Arm. +órsos (Attic ὄρρος, OHG ars), CArm. oṙ (usually plur. oṙkʻ) 'behind' and therefore has to be assumed anyway. Cf. also the example aṙu treated above under prothesis. While Schmitt, *Grammatik,* pp. 72f. limits metathesis to cases of obstruent plus +r (actually even plosive plus +r), Winter, "Problems III," p. 261 assumes metathesis of nasal and r in CArm. aṙn 'of the man', Gk. ἀνδρός, and Hermann, *Silbenbildung,* pp. 331-333 cites cases of +Cy metathesis as well: +-edy- > +-eyɟ- > -êɟ-, e.g., Pre-Arm. +medyo- > CArm. mêɟ 'middle'; ayl, ayloy 'other (nom., gen.)' < +alyo-, +alyosyo (Gk. ἄλλος, Lat. alius, OIr. aile, Goth. aljis). But since +y is regularly strengthened into ɟ, as will be exemplified below, mêɟ is not a clear example of metathesis; and alongside ayl (actually ayl) from +alyo- there is oɫɟ 'whole' from +olyo- (OIr. uile) and anurɟ 'dream' alongside Cret. ἄναιρον < +ἄναργον, so that these cases of presumed metathesis are not quite so clear. (As cases of metathesis they would, however, be in line with the interpretation of metathesis as syllable contact improvement; see below.) Cf. also Rüdiger Schmitt, "Die Erforschung des Klassisch-Armenischen seit Meillet (1936)," *Kratylos* 17 (1972 [1974]), 1-68, p. 10 for views on the development of Pre-Arm. +y, as well as his own analysis in "Die Lautgeschichte und ihre Abhängigkeit von der Etymologie, am Beispiel des Armenischen," *Lautgeschichte und Etymologie: Akten der VI. Fachtagung der Indogermanischen Gesellschaft, Wien, 24.-29. September 1978,* ed. by Manfred Mayrhofer et al., Wiesbaden: Ludwig Reichert, 1980, 412-430, pp. 427-430. Also Wolfgang Dressler, "Das Altarmenische und die Phonologietheorie," *Handes Amsorya (Zeitschrift für Armenische Philogie)* 90 (1976), 301-318, column 303 assumes a rather

wide range of metathesizing. Hermann misses the mark completely when he declares the change of Pre-Arm. ^+two into CArm. *erku* to be "a special kind of metathesis" (p. 332); see below.

[10]   The aspirated character of Pre-Arm. ^+s may be evident in the change $^+s > {}^+h >$ zero in sonorous environments, with occasional preservation of ^+h before a vowel: Pre-Arm. ^+sénos (Ved. *sánah*, Av. *hana-*, Gk. ἔνος, Lith. *sẽnas*), CArm. *hin* 'old'.

[11]   Via ^+gisan and ^+gsan; but see Schmitt, "Lautgeschichte," pp. 420-427 for the problems involved in this assumption.

[12]   This is Meillet's famous hypothesis, cf. *Esquisse*, [1]1903: 28f., [2]1936: 51 as well as his further remarks, most conveniently accessible in Antoine Meillet, *Études de linguistique et de philologie arméniennes*, vol. I, Lisbon: Imprensa Nacional de Lisboa, 1962, and vol. II, Louvain: Imprensa Orientaliste, 1977; see pp. I. 164, II. 15, 60-62, 113, 132f., 209-212. The hypothesis has not found general acceptance; see the references in note 22 below.

[13]   For Proto-Indo-European this syllabication is established in Hermann, *Silbenbildung*; for certain stages in the history of Classical Armenian it is vaguely suggested in the chapter on Armenian, pp. 327-334. A number of syllable-based sound changes in Germanic have been accounted for on the analogous assumption that the Proto-Indo-European syllabication of intervocalic clusters was preserved into Proto-Germanic, in Robert W. Murray and Theo Vennemann, "Sound change and syllable structure [: Problems] in Germanic phonology," *Language* 59 (1983), pp. 514-528. The syllabication rule *-VCCV-* ◊ *-VC$CV-* is certainly the simplest and most general cluster division rule that a language may have, and it can indeed be found in many languages. Nevertheless it may be problematical when viewed against the actual clusters it divides. E.g., a division of *rt* as *r$t* is "good" and is, in fact, nearly universal; but a division of *tr* as *t$r* is not so "good," and while many languages have this heterosyllabication in conformity with the general rule, others tautosyllabicate this and similar clusters within the second syllable. E.g., Standard German divides *rt* but not *tr*: e.g., *werte* /ve:r$tə/ 'values' but *metrisch* /me:$trı̌š/ 'metrical', *Tatra* /ta:$tra/, */ta:t$ra/. Such differential syllabication requires a more complicated syllabication rule but is in better agreement with the Syllable Contact Law (see below). In other words, given an ordinary array of clusters there cannot be a syllabication rule that is at once most "simple" and most "natural" (both expressions understood in the technical sense, the latter as "preferred according to a universal preference law"). Much of the phonological history of a language is a tug-of-war between generality and naturalness of syllabication; "a syllabification -VP.LV- is equally as possible as -V.PLV- . . .; and languages vary one from another, and from period to period, in the functioning of such sequences" (W. Sidney Allen, *Accent and rhythm: Prosodic features of Latin and Greek: A study in theory and reconstruction*, Cambridge: Cambridge University Press, 1973, p. 71). A number of Indo-European languages, among them the classical and the Germanic languages, have shifted from generality to greater naturalness. By contrast, according to the theory presented here, Armenian has eliminated the most serious deviations from greatest naturalness and thereby has managed to maintain the maximally general syllabication rule inherited from Proto-Indo-European throughout its history.

[14] In a theory which expresses Consonantal Strength by assigning speech sounds numerical values on Consonantal Strength scales, the difference referred to in the above preference laws becomes the arithmetical difference between the assigned values. E.g., the Syllable Contact Law assumes the following formulation (cf. Murray and Vennemann, "Sound change", p. 520):

> **Syllable Contact Law:** The preference for a syllable contact $A\$B$, where α and β are the Consonantal Strength values of the speech sounds A and B respectively, increases with the value of β minus α.
>
> **Corollary:** The tendency for a syllable contact $A\$B$ to change, where α and β are the Consonantal Strength values of the speech sounds A and B respectively, increases with the value of α minus β.

Assuming, e.g., that b is assigned the value 5 and r the value 2, the characteristic difference of the syllable contact $b\$r$ is 2 minus 5, i.e., -3, whereas that of $r\$b$ is 5 minus 2, i.e., 3. Therefore $b\$r$ is a rather bad syllable contact and thus fairly liable to change, whereas $r\$b$ is by comparison a good contact and less liable to change. It follows in particular that the change of $b\$r$ into $r\$b$ is a clear-cut case of syllable structure improvement; its occurrence does not occasion surprise. By contrast, a change $r\$b$ into $b\$r$ would not be a case of syllable structure improvement; it would be a very unlikely change and certainly one not motivated by syllable structure. As a matter of fact, such a change has never been observed as a sound change. By the same token, the characteristic difference of a syllable onset $\$br$ would be 5 minus 2, i.e., 3, and that of $\$rb$, 2 minus 5, i.e., -3. According to the Syllable Onset Law, properly reformulated on the model of the Syllable Contact Law, the onset $\$br$ is much better than $\$rb$, and a change of $\$br$ into $\$rb$ is thereby recognized as quite out of the question. While these different syllable and contact types are here characterized in purely phonological terms ("Consonantal Strength") and will be linked to phonetics merely by the unspecific concept of relative sonority (see below), the ultimate explanation of the preference laws has, of course, to be formulated in purely phonetic terms; cf. Allen, *Accent*, pp. 69-71 et passim for relevant suggestions.

[15] Sporadic prothesis is also assumed for Greek, namely before all nasals, liquids, and glides (i.e., μ, ν, λ, ϱ, and ϝ, since [+]y had changed partly into h, partly into ζ), and before certain clusters; cf. Eduard Schwyzer, *Griechische Grammatik*, vol. I, Munich: C.H. Beck, [2]1953, pp. 411-413 and p. 313. A variety of sources are assumed for the prothetic vowels, cf. Robert S.P. Beekes, *The development of the Proto-Indo-European laryngeals in Greek*, The Hague: Mouton, 1969, p. 18. Where Greek and Armenian go together in having (apparent) prothesis, a Proto-Indo-European origin as reflex of a laryngeal is assumed, following Jerzy Kuryłowicz, by Beekes, *Development*, pp. 21-23, 73f. and by Kortlandt, "Relative Chronology," p. 103; and Edgar C. Polomé, "Armenian and the Proto-Indo-European laryngeals," *First International Conference on Armenian Linguistics: Proceedings*, ed. by John A.C. Greppin, Delmar, New York: Caravan Books, 1980, 17-33, p.29, concludes that the Armenian prothesis is one of only two areas where reflexes of laryngeals can safely be assumed. But the arguments are found unconvincing by Hans Jonsson, *The laryngeal theory: A critical survey*, Lund: CWK Gleerup, 1978, pp. 119f.; and Frederik Otto Lindeman, *The triple representation of schwa in Greek and some related problems of Indo-Eurpean phonology*, Oslo: Universitetsforlaget, 1982, pp. 57-68, rejects laryngealist explanations for the majority of cases and seems satisfied only with the assumption of [+]a- deriving from a vocalized initial laryngeal in Greek, because "this is exactly what we find in the rare cases where a Greek prothetic vowel can be compared to etymologically related forms with a preserved ḫ- in Anatolian" (pp.

57f.). For the purposes of this article the question of the origin of *sporadic* prothesis in Greek generally, and in Armenian before *n* (CArm. *anun*, Gk. ὄνομα 'name', CArm. *inn*, Gk. ἐννέα 'nine' as opposed to CArm. *nor*, Gk. νε(ϝ)αρός 'new'), *l* (CArm. *aluēs*, Gk. ἀλώπηξ 'fox' as opposed to CArm. *loys* 'light', Gk. λευκός 'white') and consonant clusters (CArm. *astl*, Gk. ἀστήρ 'star' as opposed to CArm. *stipem* 'I urge', Gk. στείβω 'I tread (on)') is not very important, because the Armenian prothesis before ⁺*r*- is unexceptionable, applying even to ⁺*r*- deriving from ⁺*t'r*- (Pre-Arm. ⁺*t'rins*, CArm. *eris* 'three (acc.)') and to loanwords (CArm. *erank'* 'thigh', Avest. *rāna-*); cf. Beekes, *Development*, pp. 21f. It is, of course, conceivable that initial vowel-plus-r clusters from a laryngeal or some other source served as a model for the general Armenian prothesis rule; but the question would remain of why the generalization remained limited to the case of initial *r*.

[16] Schmitt, *Grammatik*, p. 70, citing as his only example Lith. *júra*, plur. *júrès* 'sea', CArm. *jur* 'water'. Frederik Kortlandt has kindly pointed out in his letter (see note * above) that in his opinion this connection "is undoubtedly wrong because *jūra* can hardly be separated from OPr. *wurs* and Skt. *vāri*, so the *j*- is a Lithuanian development." (The connection is likewise rejected in John A.C. Greppin, "The Armenian reflexes of IE **w* and **y*", *Revue des Études Arméniennes* 9 (1972), 69-78, p. 76.) In Kortlandt's own opinion, "initial **y*- was lost . . . except before *i*, where it merged with **h*-" ("Notes on Armenian historical phonology III: *h*-," *Studia Caucasica* 5 (1983), 9-16, p. 15). Likewise, Greppin, "Armenian reflexes," p. 77 assumes loss of initial ⁺*y* in at least two roots; but compare the complications treated in his "Hypercorrection in Armenian," *Annual of Armenian Linguistics* 4 (1983), 67-71. However this may be, the fact that matters to my argument is that ⁺*y* was eliminated word-initially, together with ⁺*w* and ⁺*r*; whether it was strengthened, or lost or dissimilated, makes no difference for my purpose.

[17] To the possible exclusion of inherited and newly developed laryngeals; cf. note 10 above and Frederik Kortlandt, "Notes III," with further references. Strengthening of CArm. *h*- into *x*- seems to have occurred in a number of contemporary Eastern Armenian dialects, e.g., *hin* 'old' > *xin*, cf. John A.C. Greppin, "Some Comments on the Chronology of Secondary Aspiration in Classical Armenian," *Zeitschrift für vergleichende Sprachforschung* 96 (1982/83), 146-151, p. 149. There are interesting parallels of languages eliminating precisely word-initial *y*, *w*, *r*, and no others. E.g., in Greek initial ⁺*y* appears as *h* or ζ, ⁺*w* as zero or, rarely, *h* (Schwyzer, *Grammatik*, pp. 313, 225-227), and initial *r* of whatsoever origin is invariably devoiced (ῥ-, i.e., [r̥], cf. Schwyzer, *Grammatik*, pp. 309f., W. Sidney Allen, *Vox graeca*, Cambridge: Cambridge University Press, 1968, pp. 39-43), initial devoicing being a kind of strengthening; and in Spanish, as Robert Murray has pointed out in his letter (see note * above), initial Lat. *y*, *w*, *r* are reflected as *j* [x], *v* [b], and *r* [r̄] (with the sound of *carro*, not *caro*), while initial *l* and all stronger consonants retain their old strength.

[18] This applies to the initial groups *sp*-, *st*- and possibly *sx*-:
Pre-Arm. ⁺*sprnāmi* (cf. Lat. *spernō* 'I push aside', ON *sperna* 'to push aside'), CArm. *sparnam*
Pre-Arm. ⁺*steryX*, CArm. *sterj*
CArm. *sxalem* 'I stumble, err' ~ Ved. *skhal-* 'to stumble', *skhálate*
The concept of an appendix (Sievers' Nebensilbe) is analyzed and applied to Standard German in my paper "Zur Silbenstruktur der deutschen Standardsprache" in Theo

Vennemann, ed., *Silben, Segmente, Akzente*, Tübingen: Max Niemeyer, 1982, 261-305, pp. 296-299. In the traditional pronunciation of Armenian, these and other initial sibilant clusters are supported by prothetic [ə]. This rule dates back at least to Classical Armenian (Schmitt, *Grammatik*, p. 30f.), but beyond that its age is unknown.

[19] Antoine Meillet, in "De la prothèse vocalique en grec et en arménien," *Bulletin de la Société de Linguistique de Paris* 27 (1927), 129-135 [reprinted in Meillet, *Études* (cf. fn. 12 above), II. 233-239], includes Pre-Arm. ^+r- as well as certain clusters, e.g., ^+st- in *astł* 'star', in the scope of (regular or sporadic) prothesis but does not consider there clusters of obstruent plus ^+r (nor ^+tk-, see below). There exists, incidentally, a problem with Classical Armenian word-initial sr derived from Pre-Arm. $^+\v{k}'r$ in *srunk'* 'shins (pluraletantum)', Pre-Arm. $^+\v{k}'rūs$-*ni*-, cf. Lat. *crūs* 'leg, shin'. At the time when Pre-Arm. ^+s changed to ^+h, $^+\v{k}'r$ obviously could not have changed to sr yet. But then: Why didn't the initial cluster induce prothesis? The only answer I can think of (assuming, of course, that the etymology is correct, cf. Schmitt, "Erforschung", p. 26), is that the reflex of word-initial $^+\v{k}'r$- at the time when prothesis struck was not a genuine cluster but pronounced with an anaptyctic vowel, perhaps as $^+\v{c}'ṛr$-, $^+c'ṛr$- or as $^+\v{c}'ər$-, $^+c'ər$-. In contemporary Armenian all initial Cr groups are realized as [Cər] in normal pronunciation, cf., e.g., W. Sidney Allen, "Notes on the phonetics of an Eastern Armenian speaker," *Transactions of the Philological Society* 1950, 180-206, pp. 184-187. The same is assumed for Classical Armenian in Schmitt, *Grammatik*, p. 31; cf. the example *brem* 'I dig' (p. 35), which is there opposed to *berem* 'I carry' and *burem* 'I smell' as illustrating a contrast of /ə/ with the full vowels. Some problems of the synchronic phonology of CArm. [ə] are illustrated in Wolfgang U. Dressler, "Was erwarten Phonologie-Theorien von der Indogermanistik - was kann die Indogermanistik bieten?," *Lautgeschichte und Etymologie*, 102-119, pp. 102-106.

[20] Cf. the exemplification in note 14 above.

[21] This interpretation agrees with Meillet's view that ^+w became a velar plosive also in clusters (*Esquisse*, ^{1}1903: 28, ^{2}1936: 50f.). Such a development is likely as a case of rule generalization: The change $^+w > g$ (originally: $^+w > ^+g^w$, with subsequent $^+g^w > g$) started where it was motivated as a syllable structure improvement, viz. as an increase of Consonantal Strength where ^+w is the sole speech sound within a syllable onset, cf. the Syllable Onset Law; the change then generalized into positions where it is not motivated by syllable structure, thus preserving the phonetic identity of the speech sound. An analogy can be seen in the strengthening of ^+w into v in German and Icelandic, which also took place both for $\$w$- and $\$Cw$. The matter is seen differently by Kortlandt in "Notes on Armenian phonology I," *Studia Caucasica* 3 (1976), 91-100 and in "Relative chronology," following Holger Pedersen, "Zur armenischen Sprachgeschichte," *Zeitschrift für vergleichende Sprachforschung* 38 (1905), 194-240 [reprinted in Holger Pedersen, *Kleine Schriften*, 56-102], who declared a change of ^+w into g after obstruents to be "totally improbable" (p. 197) and assumed $^+sw > ^+hw > ^+k'w > k'$ (p. 197) and ($^+tw >$) $^+t'w > ^+k'w > k'$ (pp. 197f.). Cf. Kortlandt, "Notes I," pp. 96, 98, "Relative chronology," pp. 99, 100, 101. Kortlandt, like Pedersen, very naturally extends this kind of interpretation to PIE ^+dw (according to the traditional reconstruction): $^+dw > ^+d^w > ^+g^w > \ldots > k$ ("Notes I," p. 98, "Relative chronology," pp. 99, 100). This homogeneous treatment of sequences of dentals plus ^+w is possible for him because like Pedersen he does not believe in Meillet's hypothesis PIE ^+dw- (traditional reconstruction) > CArm. *erk*-. Since I am convinced that Meillet's

hypothesis is correct (see below), I see the homogeneity in the evolution of clusters of ^+w with aspirates, thus setting apart Pre-Arm. ^+tw (PIE ^+dw according to the traditional reconstruction), which lacks aspiration. Sidney Allen in his letter (see note * above) has kindly pointed out a parallel to the change of s into aspiration on a following plosive, viz. the regular Middle Indian development of sT into $T^{\cdot}$; e.g., Skt. $pauṣkara$- > Pkt. $pokkhara$- > e.g., Hindi $pokhar$ 'lotus, (lotus) pool', Skt. $hasta$- > Pkt. $hattha$- > Hindi $hāth$ 'hand'.

[22] Schmitt, "Erforschung," pp. 10f. Kortlandt may now be added to the list of dissenters: "It is astonishing to see how Meillet's supposition that initial *dw yielded rk, which is based on erku, Skt. dvá, and erknč'im, Gr. déos, is repeated over and over again more than half a century after Pedersen's fully convincing demonstration that this identification cannot be upheld" ("Notes I," p. 98, with reference to Holger Pedersen, "Armenisch und die Nachbarsprachen," pp. 398f.). The reason for this fact which astonishes Kortlandt is simple enough: Those repeating Meillet's "supposition" have not been convinced by Pedersen's contrary argument (the salvaging part of which is that the portion er- of erku 'two' was prefixed to the reflex ^+ku of the Proto-Indo-European etymon on the model of erek' 'three'). However, even for those convinced that Meillet's equation is correct the change itself has so far remained problematical from a phonological point of view; see, e.g., Dressler, "Das Altarmenische," column 305: "Schwierig bleibt Meillets Lautgesetz $dw > erk/\#$ ___ , z.B. in idg. $dwōu >$ aarm. erku, vielleicht 1. $dw > rdw$ (??), 2. Vokalprothese, 3. Lautverschiebung $d > t$, 4. $w > g^W > g$, 5. Assimilation $tg > tk$, 6. Vereinfachung $tk > k$." (The question marks are Dressler's.) I hope to show directly that Meillet's change actually fits very naturally into the total phonological development of Classical Armenian, provided all changes are interpreted in a syllabic framework.

[23] The essential ingredients are all in Meillet's most explicit statement in his Esquisse, ^{1}1903: 28f., ^{2}1936: 51. He sees in the k of CArm. erk- the ^+g of strengthened ^+w, in the r or erk- a reflex of the sonorous articulation of ^+d (of the assumed PIE ^+dw-), and in the e- the effect of prothesis by the general rule, i.e., before initial ^+r-. But his particular traditional frame of reference leads him to the additional assumption that the change of the group ^+dw is anterior to the Armenian Consonant Shift (^{1}1903: 29, ^{2}1936: 51): ^+dw- > ^+dg- > ^+rg- > ^+erg-, and now $^+g > k$ by the presumed Armenian shift of mediae into tenues. This is, however, not an inherent part of Meillet's hypothesis; r may be assumed to be a reflex of the dental not qua sonorous (i.e., ^+d), but qua syllable final (which leaves open the question whether the dental was ^+d or ^+t). Meillet's ingredients will be presented as a coherent whole directly.

[24] Schmitt, Grammatik, p. 72. Kortlandt kindly points out in his letter (see note * above) that "OIr. idu does not exist. MIr. idu can be derived from *$pidunā$ and compared with Gothic fitan." Idu and fitan 'to be in labor' are also connected in Sigmund Feist, Vergleichendes Wörterbuch der gotischen Sprache, Leiden: E.J. Brill,^{3}1939, s.v.

[25] Evidently metathesis, the device used to eliminate $^+C\$r$ contacts, was not suitable for $^+t\$k$ because the ensuing *$k\$t$ was itself a prohibited cluster in Armenian. The assumption of coda weakening - as Wolfgang U. Dressler kindly pointed out in his letter (see note * above) - tallies with the fact that Arm. /r/ (as opposed to vibrant /ř/) was a tap and thus a "weak rhotic," cf. his "Phonologie-Theorien," p. 109. To readers not

familiar with the theory of syllable structure the assumption of these contact-improving changes may appear *ad hoc*. That it is not is shown by parallel sound changes in other languages; cf. Murray and Vennemann, "Sound change" as well as, by the same authors, "Syllable contact change in Germanic, Greek and Sidamo," *Klagenfurter Beiträge zur Sprachwissenschaft* 8 (1982), 321-349, where the following additional devices are illustrated: gemination (e.g., $VC\$rV > VC\$CrV$), resyllabication (e.g., $VC\$rV > V\$CrV$), and onset strengthening (e.g., $r\$w > r\$b$, $l\$w > l\$b$ in German *farwe* > *farbe* 'color', *falwe* > *falbe* 'dun-colored horse', where otherwise $w > v$ in word-initial onsets, e.g., *wasser* 'water', and $w >$ zero in codas, e.g., *falw* > *fahl* 'sallow'). Also assimilation, anaptyxis, and epenthesis can effect syllable contact improvements (e.g., $C\$r > r\$r$, $VC\$rV > V\$Ca\$rV$, $n\$r > n\$dr$). The most forceful analogy for the Armenian change $^+t\$k > r\$k$ assumed here is Klingenheben's Law for Hausa by which all dentals were weakened to r and all labials and velars to w syllable-finally in the history of Hausa, cf. August Klingenheben, "Die Silbenauslautgesetze des Hausa," *Zeitschrift für Eingeborenen-Sprachen* 18 (1928), 272-297. Note in particular the example *farke* < $^+$*fatke* 'merchant', plur. *fatāke*.